


EXHIBIT J


Exemplary Infringement Chart for U.S. Patent No. 10,145,115


Reflective roof granules produced by Amberger Kaolinwerke, including but not limited to the AKCool Solar Reflective Granules, (“AKW Products”) infringe, by way of at least contributory and induced infringement, the asserted claims of U.S. Patent No. 10,145,115 (the “’115 Patent”). Each of the following limitations is met literally, and, to the extent a limitation is not met literally, it is met under the doctrine of equivalents.

This claim chart is based on information currently available to U.S. Silica. Such information is intended to be exemplary in nature with respect to a representative product. U.S. Silica reserves all rights to update and elaborate upon its infringement positions, including the right to amend its infringement positions as U.S. Silica obtains additional information in discovery concerning the AKCool Solar Reflective Granules or other products that may infringe the asserted claims or other claims of the ’115 Patent.

Claim 1	
’115 Patent Claim	AKW Products
1[pre] A cool roofing system comprising:	<p>The AKW Products are intended to be incorporated into a cool roofing system. The AKW Products are incorporated into cool roofing systems by AKW customers, who are manufacturers of such systems.</p> <p>“The invention relates to a roof coating comprising a bitumen layer with embedded particles.” ’947 Patent, Abstract.</p> <p>The AKW Products, including AKCool® patented Solar Reflective Granules, are incorporated into “cool roofing systems” and are “specially developed for bitumen mineral cap sheets used on roofs.”</p>


Claim 1			
'115 Patent Claim	AKW Products		
	 AKCool® – PATENTED TECHNOLOGY <p>The new, patented AKCool® granules are specially developed for bitumen mineral cap sheets used on roofs. The product is characterized by permanently high reflectance values and especially long durability. As a result, AKCool® helps lower building temperatures, minimize energy and operating costs, and meet building environmental standards.</p> <table border="0"> <tr> <td> Optimized granules: <ul style="list-style-type: none"> → Completely reflective (due to reflective core material) → Optimized flaked granule shape and ideal particle size distribution for perfect coverage and fixation → High hardness → Minimal fines, low dusting → Absolutely UV-resistant </td><td> Optimized surface: <ul style="list-style-type: none"> → Minimum staining thanks to highly hydrophobic and oleophobic surface → Long-term durability of granules brings long-term reflectance to the roof system → Perfect adhesion to bitumen surface due to microporous flake surface </td></tr> </table>	Optimized granules: <ul style="list-style-type: none"> → Completely reflective (due to reflective core material) → Optimized flaked granule shape and ideal particle size distribution for perfect coverage and fixation → High hardness → Minimal fines, low dusting → Absolutely UV-resistant 	Optimized surface: <ul style="list-style-type: none"> → Minimum staining thanks to highly hydrophobic and oleophobic surface → Long-term durability of granules brings long-term reflectance to the roof system → Perfect adhesion to bitumen surface due to microporous flake surface
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	 <p>SAVE.</p> <ul style="list-style-type: none"> → Less energy needed for cooling, reduces energy costs and minimizes CO₂ emission → Robust and durable, reduces operating and maintenance costs → Counters the urban heat island effect, improving the microclimate in urban areas → Helps meet ever-stricter environmental standards for buildings in terms of energy savings → An important factor for LEED sustainability certification

Claim 1	
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	 <p>With AKCool® solar reflective granules you're choosing quality made in Germany.</p> <p>Amberger Kaolinwerke is a specialist in extracting, processing and refining of industrial minerals and has access to significant amounts of the highest-quality raw materials. This enables us to supply our products to markets around the world. Our AKCool® solar reflective granules are the result of more than 10 years of experience and continuous development work in the field of cool roof applications.</p> <p>Amberger Kaolinwerke is a member of the European Cool Roofs Council. This non-profit organization has set itself the task of promoting research and development of cool roof technologies and setting reliable quality standards for products and materials.</p> <p>MADE IN GERMANY</p> <p>ECRC EUROPEAN COOLROOFS COUNCIL</p> <p>Ex. E; <i>see also</i> photos in <i>id.</i> (showing AKCool granules layered on top of an asphalt/bitumen layer).</p>
1[a] at least one asphalt layer; and	The AKW Products are intended to be applied, as a layer, directly on top of an asphalt or bitumen layer. AKW customers manufacture cool roofing systems including an asphalt layer and a granular layer.



Ex. E.

Claim 1	
'115 Patent Claim	AKW Products
	 <p>Ex. E.</p> <p><i>See also</i> information for element 1[pre] above.</p>
1[b] at least one granular layer adhered to or embedded in an exposed surface of the at least one asphalt layer,	<p>The AKW Products are applied in a layer on and adhered to or embedded in an exposed surface of an asphalt layer.</p> <p><i>See, e.g.,</i> information for element 1[a] above.</p>
1[c] the at least one granular layer being a top-most layer of the cool roofing system and comprising a plurality of crushed kaolin chamotte particles	<p>When the AKW Products are applied to an asphalt layer, they form the top-most layer of the cool roofing system and comprise a plurality of crushed kaolin chamotte particles.</p> <p><i>See</i> information for element 1[a] above and the following:</p>

Claim 1

'115 Patent Claim

AKW Products

 **AKCool® – PATENTED TECHNOLOGY**

The new, patented AKCool® granules are specially developed for bitumen mineral cap sheets used on roofs. The product is characterized by **permanently high reflectance values and especially long durability**. As a result, AKCool® helps lower building temperatures, minimize energy and operating costs, and meet building environmental standards.

Optimized granules:

- Completely reflective (due to reflective core material)
- Optimized flaked granule shape and ideal particle size distribution for perfect coverage and fixation
- High hardness
- Minimal fines, low dusting
- Absolutely UV-resistant

Optimized surface:

- Minimum staining thanks to highly hydrophobic and oleophobic surface
- Long term durability of granules brings long term reflectance to the roof system
- Perfect adhesion to bitumen surface due to microporous flake surface



Flake shaped structure of AKCool®



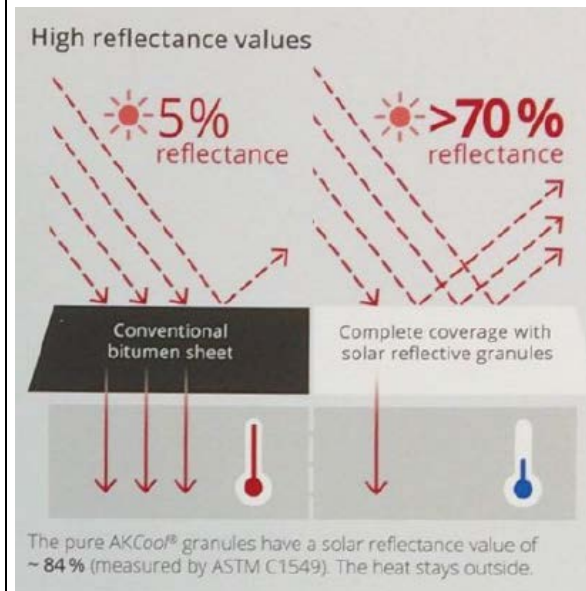
AKCool® is coated to repel water and oil.

Ex. E.

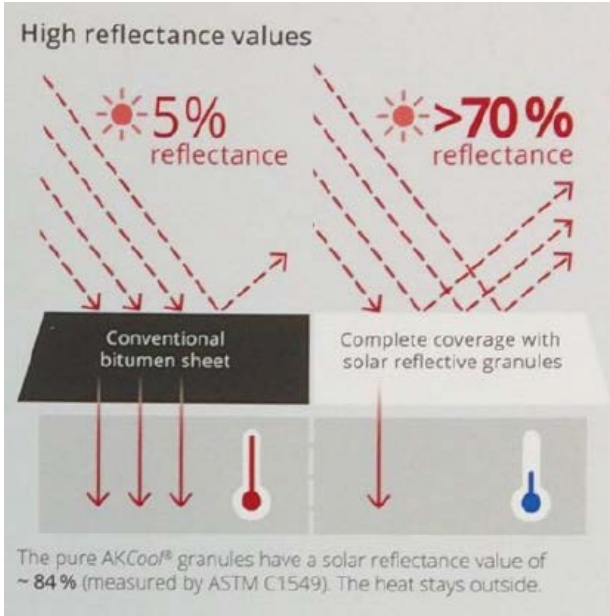
Claim 1	
'115 Patent Claim	AKW Products
	<p>The AKCool granules are disclosed as being “completely reflective (due to reflective core material)” and are claimed to be “patented.” Ex. E.</p> <p>“1. A roof coating comprising a bitumen layer with embedded particles, wherein said embedded particles comprise particles that are fired mixtures of from 40 to 70% by weight clay minerals; from 0 to 32% by weight crystalline silicas; from 28 to 45% by weight feldspar; from 0 to 15% by weight other aggregates, wherein said fired mixtures have an open porosity of 0 to 14% by volume as measured according to DIN EN 993-1:1995.”</p> <p>'947 Patent, Claim 1.</p> <p>The Examples in the '947 Patent include China clay. '947 Patent, Example 1.</p> <p><i>See also</i> Complaint at ¶¶ 37, 39, 46.</p>
1[d] having a solar reflectance prior to the surface treatment of about 80% to about 92%,	<p>The AKW Products have a solar reflectance ranging from about 80% to about 92% prior to any added surface treatment.</p> <p>The AKCool granules are disclosed as being “completely reflective (due to reflective core material)” and having a “permanently high reflectance value and especially long durability.” Ex. E.</p>

Claim 1**'115 Patent Claim****AKW Products**

“Pure” AKCool granules have a solar reflectance of ~84% as measured by ASTM C1549:

**Typical product features:**

Property	Unit	Typical value	Test method
Solar reflectance	%	~ 84	ASTM C1549
Moisture content	%	≤ 0.5	DIN EN ISO 787-2
Water repellence	Min	≥ 120	ARMA Water repellency test
Hardness	-	≥ 7	MOHS
Particle size	mm	0.5 – 2.4	DIN 66165
Particle size	mesh	35 – 8	ASTM E11
Fines (< 150 µm)	%	≤ 0.5	DIN 66165
Fines (< 100 mesh)	%	≤ 0.5	ASTM E11

Claim 1	
'115 Patent Claim	AKW Products
	Ex. E.
1[d] the cool roofing system having a minimum solar reflectance of 70% or greater, and	<p>When the AKW Products are applied to an asphalt layer, the resulting cool roofing system has a minimum solar reflectance of 70% or greater.</p> <p>The “pure” AKCool particles are stated to have a solar reflectance of ~84%, and they are shown to include a reflectance of >70% when applied to fully cover an asphalt layer.</p>  <p>Ex. E.</p>

Claim 1	
'115 Patent Claim	AKW Products
1[e] the surface treatment consisting of a clear coating is selected from the group consisting of silanes, siloxanes, polysiloxanes, organo-siloxanes, silicates, organic silicates, silicone resins, acrylics, urethanes, polyurethanes, glycol ethers and mixtures thereof.	<p>The AKW Products have a surface treatment consisting of a clear coating that is selected from the group consisting of silanes, siloxanes, polysiloxanes, organo-siloxanes, silicates, organic silicates, silicone resins, acrylics, urethanes, polyurethanes, glycol ethers and mixtures thereof.</p> <p>AKCool granules are disclosed to include a surface treatment coating, and the core is disclosed to be “completely reflective.”</p>

Claim 1

'115 Patent Claim

AKW Products



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Optimized granules:

- Completely reflective (due to reflective core material)
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Optimized surface:

- Minimum staining thanks to highly hydrophobic and oleophobic surface
- Long term durability of granules brings long term reflectance to the roof system
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Flake shaped structure of AKCool®

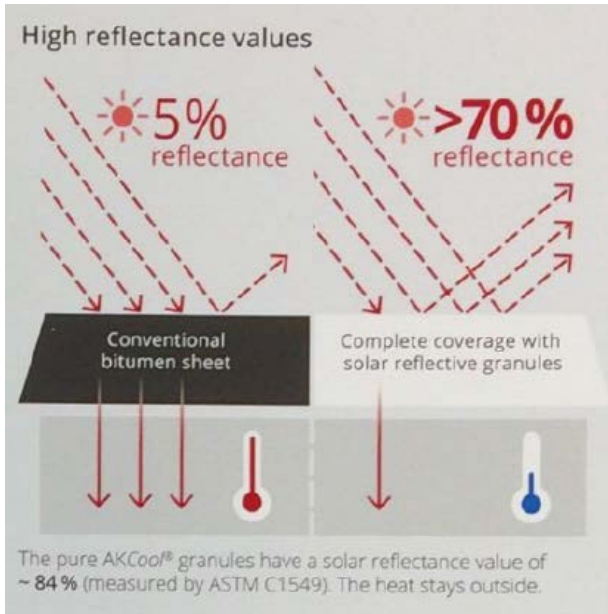


AKCool® is coated to repel water and oil.

Ex. E.

Claim 1	
'115 Patent Claim	AKW Products
	<p>The coating is thus clear.</p> <p>The '974 Patent indicates that the Example particles are coated with Unidyne TG-8111 from Daikin Chemical Ltd. which is fluoroalkyl acrylate. The '974 Patent indicates that Unidyne TG-8111 coating was diluted with water in a 5:1 ratio, that the coating was applied at a maximum of 0.6% by weight of the particles, and that the reflectivity was not significantly deteriorated by application of the coating. '974 Patent at 3:64-67, 6:14-18.</p> <p><i>See also</i> Ex. E (product flyer).</p>

Claim 2	
'115 Patent Claim	AKW Products
2. The cool roofing system according to claim 1, wherein the cool roofing system has a solar reflectance of about 70% to about 82%.	<p>When the AKW Products are applied to an asphalt layer, the resulting cool roofing system has a solar reflectance of about 70 to about 82%.</p> <p>The “pure” AKCool particles are stated to have a solar reflectance of ~84%, and they are shown to include a reflectance of >70% when applied to fully cover an asphalt layer.</p>

Claim 2	
'115 Patent Claim	AKW Products
	 <p>The diagram illustrates the difference in solar reflectance between a conventional bitumen sheet and AKCool granules. On the left, a 'Conventional bitumen sheet' is shown with a sun icon and '5% reflectance'. Red dashed arrows representing solar radiation hit the sheet and are mostly absorbed, with only a few reflected. Below the sheet, a thermometer shows a high red liquid level, indicating heat. On the right, 'Complete coverage with solar reflective granules' is shown with a sun icon and '>70% reflectance'. Red dashed arrows hit the granules and are mostly reflected away from the surface. Below the granules, a thermometer shows a low blue liquid level, indicating less heat. Text at the bottom states: 'The pure AKCool® granules have a solar reflectance value of ~84% (measured by ASTM C1549). The heat stays outside.'</p> <p>Ex. E.</p>

Claim 3	
'115 Patent Claim	AKW Products
3. The cool roofing system according to claim 1, wherein the crushed kaolin chamotte particles have a particle size ranging from about 0.3 mm to about 2.4 mm.	<p>The AKW products have a particle size ranging from about 0.3 mm to about 2.4 mm.</p> <p>AKCool granules are disclosed to have a particle size of 0.5-2.4 mm:</p>

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	<div>Typical product features:</div> <table><tr><th>Property</th><th>Unit</th><th>Typical value</th><th>Test method</th></tr><tr><td>Solar reflectance</td><td>%</td><td>~ 84</td><td>ASTM C1549</td></tr><tr><td>Moisture content</td><td>%</td><td>≤ 0.5</td><td>DIN EN ISO 787-2</td></tr><tr><td>Water repellence</td><td>Min</td><td>≥ 120</td><td>ARMA Water repellency test</td></tr><tr><td>Hardness</td><td>-</td><td>≥ 7</td><td>MOHS</td></tr><tr><td>Particle size</td><td>mm</td><td>0.5 - 2.4</td><td>DIN 66165</td></tr><tr><td>Particle size</td><td>mesh</td><td>35 - 8</td><td>ASTM E11</td></tr><tr><td>Fines (< 150 µm)</td><td>%</td><td>≤ 0.5</td><td>DIN 66165</td></tr><tr><td>Fines (< 100 mesh)</td><td>%</td><td>≤ 0.5</td><td>ASTM E11</td></tr></table>			Property	Unit	Typical value	Test method	Solar reflectance	%	~ 84	ASTM C1549	Moisture content	%	≤ 0.5	DIN EN ISO 787-2	Water repellence	Min	≥ 120	ARMA Water repellency test	Hardness	-	≥ 7	MOHS	Particle size	mm	0.5 - 2.4	DIN 66165	Particle size	mesh	35 - 8	ASTM E11	Fines (< 150 µm)	%	≤ 0.5	DIN 66165	Fines (< 100 mesh)	%	≤ 0.5	ASTM E11
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Claim 5	
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5. The cool roofing system according to claim 1, wherein the at least one granular layer is directly adhered to the exposed surface of the at least one asphalt layer	<p>When applied to an asphalt layer, the AKW Products are directly adhered to the exposed surface of the at least one asphalt layer.</p> <p>See information for elements 1[a] and 1[b] above.</p>